

IN THE DRAWINGS

The attached sheets of drawings include changes to Figs. 16-18. These sheets, which include Figs. 16-18, replace the original sheets including Figs. 16-18.

Attachment: 3 Replacement Sheets

REMARKS/ARGUMENTS

Favorable reconsideration of this application is requested in view of the above amendments and in light of the following remarks and discussion.

Claims 4-8, 11-15, 18, 19, and 22-27 are pending. Claims 4-7 and 22-27 are withdrawn. Claims 1-3, 9, and 10 are canceled without prejudice or disclaimer. Claims 8, 11, 12, 13, 14, 15, 18, and 19 are amended. Support for the amendment to Claim 8 can be found at page 36, line 4 – page 41, line 2 of the specification and in original Claim 18, for example. Support for the amendments to Claims 11-15, 18, and 19 is self-evident. No new matter is added.

In the outstanding Office Action, the drawings were objected to as not including a legend for Figs. 17-19. The specification was objected to as including a trademark without proper identification of the mark. Claim 10 was rejected under 35 U.S.C. § 112, second paragraph, as indefinite. Claim 8 was rejected under 35 U.S.C. § 102(b) as anticipated by Nagaiwa et al. (U.S. Patent Pub. No. 2002/0029745, herein “Nagaiwa”). Claims 1 and 2 were rejected under 35 U.S.C. § 103(a) as obvious over Maeda et al. (U.S. Patent Pub. No. 2001/0022293, herein “Maeda”). Claim 3 was rejected under 35 U.S.C. § 103(a) as obvious over Maeda in view of Fink et al. (U.S. Patent Pub. No. 2004/0028837, herein “Fink”). Claims 9, 10, 12, 16, and 18 were rejected under 35 U.S.C. § 103(a) as obvious over Nagaiwa in view of Koshiishi et al. (U.S. Patent Pub. No. 2003/0106647, herein “Koshiishi”). Claim 13 was rejected under 35 U.S.C. § 103(a) as obvious over Nagaiwa in view of Koshiishi and further in view of Kanno et al. (U.S. Patent Pub. No. 2003/0164226, herein “Kanno”). Claim 17 was rejected under 35 U.S.C. § 103(a) as obvious over Nagaiwa in view of Koshiishi and further in view of Shoda et al. (U.S. Patent Pub. No. 2001/0008172, herein “Shoda”). Claim 19 was rejected under 35 U.S.C. § 103(a) as obvious over Nagaiwa in view of Koshiishi and further in view of Huang (U.S. Patent Pub. No. 2004/0005726, herein “Huang”).

Regarding the objection to the drawings, the outstanding Office Action refers to Figs. "17-19" and requests that these be labeled with a legend such as "Prior Art." However, Applicants respectfully note that only Figs. 1-18 are included in the present application. Accordingly, Applicants understand the outstanding Office Action to intend to refer to Figs 16-18 instead of Figs. 17-19. As replacement Figs. 16-18 are submitted herewith and include the legend "Prior Art" as requested in the outstanding Office Action, Applicants respectfully submit that the objection to the drawings is overcome.

Regarding the objection to the specification for incorporating the trademark "Galden" without identifying the "Galden" as a trademark, the specification is amended to capitalize all instances of the term "Galden." Additionally, all claims reciting "Galden" have been canceled.

Regarding the rejection of Claim 10 as indefinite for reciting a trademark, Applicants respectfully submit that as Claim 10 is canceled, the rejection is moot.

Regarding the rejection of Claim 8 as anticipated by Nagaiwa, that rejection is respectfully traversed by the present response.

Amended independent Claim 8 recites an electrostatic chuck that attracts a focus ring by electrostatic attraction generated by the chuck voltage applied to the chuck device. The controller changes the chuck voltage in accordance with each of sequences of the plasma process, and in particular the controller sets the chuck voltage high during the at least one processing sequence.

One benefit of the arrangement recited in amended independent Claim 8 is that the chuck voltage is changed in accordance with each sequence of the plasma process, and therefore, cooling of the focus ring can be carried out stably so that occurrence of local deterioration of plasma processing characteristics of the object to be processed can thus be prevented or reduced. In particular, the controller sets the chuck voltage high during the

processing sequence, and hence it is possible to prevent the object to be processed from being cooled too much during sequences other than the processing sequence.

Nagaiwa relates to a plasma processing apparatus which processes a target substrate.<sup>1</sup>

In a plasma etching apparatus, an electrostatic chuck (8) is formed in a worktable (6).<sup>2</sup> The worktable (6) has a circular main surface (11A) for placing a wafer W as a target substrate thereon and a ring-like sub-surface (11B) for placing thereon a focus ring (12) that surrounds the wafer W.<sup>3</sup>

A ring-like heat transfer medium (15) is interposed between the focus ring (12) and the sub-surface (11B). The heat transfer medium (15) is disposed such that it increases heat transfer properties between the sub-surface (11B) and the focus ring (12) to be larger than that in a case wherein no heat transfer medium is disposed.<sup>4</sup>

The focus ring (12) is pressed from above with a press mechanism (16) so that the heat transfer medium (15) comes into tight contact with the sub-surface (11B) and focus ring (12).<sup>5</sup>

Thus, the heat transfer medium (15) is **mechanically** pressed to both the sub-surface (11B) and the focus ring (12) by the press mechanism (16), and hence a contact state between the heat transfer medium (15) and the sub-surface (11B) or between the heat transfer medium (15) and the focus ring (12) cannot be changed in accordance with each sequence of an etching process.

Moreover, Nagaiwa fails to teach or suggest changing a voltage, which generates electrostatic attraction for attracting the focus ring (12), in accordance with each of the sequences.

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<sup>1</sup> See paragraph [0002], lines 1 to 3.

<sup>2</sup> See paragraph [0041], lines 3 to 5.

<sup>3</sup> See paragraph [0044], lines 5 to 10.

<sup>4</sup> See paragraph [0045], lines 2 to 7.

<sup>5</sup> See paragraph [0045], lines 14 to 17.

Accordingly, Applicants respectfully submit that amended independent Claim 8 patentably distinguishes over Nagaiwa for at least the reasons discussed above.

Regarding the rejection of Claims 1 and 2 as obvious over Maeda and the rejection of Claim 3 as obvious over Maeda and Fink, Applicants respectfully submit that as Claims 1-3 are canceled without prejudice or disclaimer, the rejections are moot.

Regarding the rejection of Claims 9, 10, 12, 16, and 18 as obvious over Nagaiwa in view of Koshiishi, that rejection is respectfully traversed by the present response.

Claims 9 and 10 are canceled without prejudice or disclaimer. Therefore, the rejection of Claims 9 and 10 is moot.

Claims 12, 16, and 18 each depend from amended independent Claim 8 and patentably distinguish over Nagaiwa for at least the reasons discussed above regarding amended independent Claim 8.

Koshiishi relates to an object-holding apparatus mounted in a process chamber of a plasma processing apparatus or the like to hold an object to be processed.<sup>6</sup>

In Koshiishi, an object-holding apparatus (10) is formed of a convex holder main body (1), a first dielectric film (14a) formed to cover a wafer placing surface (11a) on the upper surface of the convex portion of the holder main body (1), a second dielectric film (14b) formed to cover a convex portion side wall surface (11c) and a flange (11b) which is on the peripheral portion of the convex portion of the holder main body (1), and a focus ring (12) to be detachably fitted on the flange (11b).<sup>7</sup>

A gas supply path (17) is formed in the holder main body (11). The gas supply path (17) is comprised of branch portions (17b) branching from a trunk portion (17a) and extending through the second dielectric film (14b) to connect to a plurality of openings (17c) formed in the upper surfaces of the second dielectric film (14b). In this arrangement, a

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<sup>6</sup> See paragraph [0004], lines 1 to 4.

<sup>7</sup> See paragraph [0029].

temperature-controlled cooling gas, e.g., helium (He) gas, from a gas supply unit (16) is sprayed to the bottom surface of the focus ring (12) through the gas supply path (17), to cool it.<sup>8</sup>

After loading of a wafer by a transfer mechanism and mounting the wafer on the first dielectric film (14a), a DC power supply (15) applies a predetermined DC voltage to the holder main body (11), to electrostatically charge the second dielectric film (14b). The focus ring (12) is strongly electrostatically attracted onto the flange (11b) by the Johnson-Rahbek force generated by the second dielectric film (14b).<sup>9</sup>

Koshiishi describes applying the predetermined DC voltage to the holder main body (11) to electrostatically charge the second dielectric film (14b) such that the focus ring (12) is strongly electrostatically attracted onto the flange (11b).<sup>10</sup>

However, Koshiishi describes only applying the predetermined DC voltage to the holder main body (11) after loading of the wafer and mounting the wafer on the first dielectric film (14a) and does not teach or suggest changing the DC voltage applied to the holder main body (11) in accordance with each of the sequences of a plasma process.

Accordingly, Koshiishi fails to remedy the deficiencies discussed above regarding Nagaiwa, and no reasonable combination of the cited references would include all of the features of amended independent Claim 8 or Claims 12, 16, and 18 depending therefrom.

Regarding the rejection of Claim 13 as obvious over Nagaiwa, Koshiishi, and Kanno, that rejection is respectfully traversed.

Kanno discloses a wafer stage (52) having gas grooves (60) for guiding heat transmission medium formed in an outer surface thereof.<sup>11</sup> The gas grooves (60) have a

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<sup>8</sup> See paragraph [0038].

<sup>9</sup> See paragraph [0041], lines 1 to 12.

<sup>10</sup> See paragraph [0045], lines 2 to 6.

<sup>11</sup> See paragraph [0070], lines 3 to 7.

width of 2 mm and a depth of 0.5 mm.<sup>12</sup> However, Kanno is devoid of any teaching or suggestion to change a voltage which generates electrostatic attraction for attracting a focus ring in accordance with each of the sequences of a plasma process. Accordingly, Applicants respectfully submit that dependent Claim 13 patentably distinguishes over any reasonable combination of the cited references for at least the reasons discussed above.

Regarding the rejection of Claim 17 as obvious over Nagaiwa, Koshiishi, and Shoda, Applicants respectfully submit that dependent Claim 17 patentably distinguishes over Nagaiwa and Koshiishi for at least the same reasons as amended independent Claim 8.

Shoda describes providing helium gas to a space (32) between a lower surface of the wafer W and an upper dielectric layer of an electrostatic chuck via a gas passage (34) formed in a susceptor (14). Moreover, Shoda describes controlling the pressure of the helium gas using a pressure controller (36). However, Shoda fails to teach or suggest changing a voltage in accordance with each sequence of a plasma process as recited in amended independent Claim 8. Accordingly, Claim 17 depending from Claim 8 patentably distinguishes over Shoda for at least the reasons discussed above.

Regarding the rejection of Claim 19 as obvious over Nagaiwa, Koshiishi, and Huang, that rejection is respectfully traversed.

Huang describes a heat transfer means controlling a temperature of a focus ring to within a range of  $100^{\circ}\text{C} \pm 30^{\circ}\text{C}$ .<sup>13</sup> However, Huang fails to teach or suggest a controller that controls the chuck voltage applied to said chuck device, said controller changing the chuck voltage in accordance with each of the sequences of a plasma process.

Thus, as none of Nagaiwa, Koshiishi, Kanno, Shoda and Huang teaches or suggests a controller that controls the chuck voltage applied to said chuck device, said controller changing the chuck voltage in accordance with each of the sequences of a plasma process as

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<sup>12</sup> See paragraph [0071], lines 1 to 2.

<sup>13</sup> See paragraph [0025], lines 10 to 12.

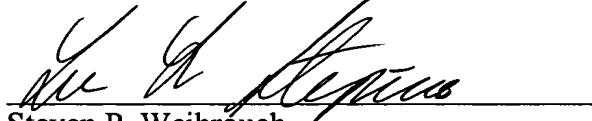
recited in amended independent Claim 8, Applicants respectfully submit that amended independent Claim 8 and each of Claims 11-15, 18, and 19 depending therefrom patentably distinguish over any reasonable combination of the cited references for at least the reasons discussed above.

For the foregoing reasons, it is respectfully submitted that this application is now in condition for allowance. A Notice of Allowance for Claims 8, 11-15, 18, 19, and 22-27 is earnestly solicited.

Should Examiner Dhingra deem that any further action is necessary to place this application in even better for allowance, Examiner Dhingra is encouraged to contact Applicants' undersigned representative at the below-listed telephone number.

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